

Flight Test Evaluation of Endurance-Maximizing Periodic Cruise Trajectories for UAV, Phase I

Completed Technology Project (2004 - 2004)



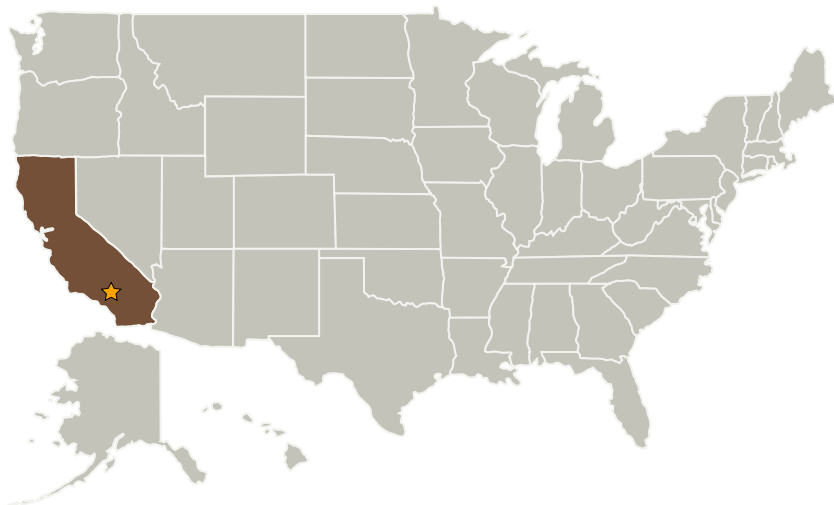
Project Introduction

The benefits of periodic cruise operation of flight vehicles have been known for three decades. Although a number of papers and doctoral dissertations have studied the periodic cruise phenomenon, they have not been systematically evaluated in any flight test program. The objective of the present research is the flight test evaluation of endurance-maximizing periodic cruise trajectories. Flight tests will be conducted in collaboration with the NASA Dryden Flight Research Center on a research UAV. A secondary objective of the proposed research effort is to investigate the use of dynamic soaring maneuvers for enhancing the UAV endurance performance. Phase I research will demonstrate the improvements in endurance performance using a UAV simulation model. Realistic UAV dynamics and atmospheric characteristics will be included in these simulations. Guidance algorithms for flying the periodic trajectories will also be developed. Based on the research findings of the Phase I research, Phase II work will refine the guidance algorithms and conduct flight test evaluation of endurance-maximizing periodic cruise trajectories. Development of periodic cruise flight control systems for production UAVs will be undertaken during the Phase III work.

Anticipated Benefits

Potential NASA Commercial Applications: Periodic cruise technology will allow commercial flying observation platforms to operate at higher efficiency.

Primary U.S. Work Locations and Key Partners



Flight Test Evaluation of
Endurance-Maximizing Periodic
Cruise Trajectories for UAV,
Phase I

Table of Contents

Project Introduction	1
Anticipated Benefits	1
Primary U.S. Work Locations and Key Partners	1
Organizational Responsibility	2
Project Management	2
Technology Areas	2

Flight Test Evaluation of Endurance-Maximizing Periodic Cruise Trajectories for UAV, Phase I

Completed Technology Project (2004 - 2004)



Organizations Performing Work	Role	Type	Location
★Armstrong Flight Research Center(AFRC)	Lead Organization	NASA Center	Edwards, California
Optimal Synthesis, Inc.	Supporting Organization	Industry Small Disadvantaged Business (SDB)	Los Altos, California

Primary U.S. Work Locations

California

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Armstrong Flight Research Center (AFRC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

P. K. Menon

Technology Areas

Primary:

- TX15 Flight Vehicle Systems
 - └ TX15.2 Flight Mechanics
 - └ TX15.2.1 Trajectory Design and Analysis